Maine Woods Company, LLC **Aroostook County** **Portage, Maine** **A-736-71-C-A**	**Departmental** **Findings of Fact and Order** **Air Emission License** **Amendment #1**

After review of the air emissions license amendment application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

1. Maine Woods Company, LLC (Maine Woods) of Portage, Maine was issued Air Emission License A-736-71-B-R on June 11, 2003, permitting the operation of emission sources associated with their hardwood sawmill and lumber drying facility.

2. Maine Woods has requested an amendment to their license in order to:

   a. correct a typographical error of the kiln capacity in License A-736-71-B-R **from** 10,400 MBF/year **to** 11,400 MBF/year;

   b. increase the kiln production capacity as licensed in A-736-71-B-R **from** 11,400 MBF/year **to** 24,334 MBF/year. This will be accomplished by the installation of three additional kilns and a new drying schedule that reduces cycle time from 16 days to 12 days; and

   c. adjust the emission factors used to calculate VOC emissions from the drying of wood in the kilns to a factor that more closely represents the wood species dried by Maine Woods.

B. Emission Equipment

The following equipment is addressed in this air emission license:

Process Equipment

Equipment	Maximum Capacity	Control Equipment
Drying Kilns	24,334 MBF/year	none

C. Application Classification

The modification of a minor source is considered a major modification based on whether or not expected emission increases exceed the "Significant Emission Levels" as defined in the Department's regulations. The emission increases are determined by subtracting the current licensed emissions preceding the modification from the maximum future licensed allowed emissions, as follows:

Pollutant	Current License (TPY)	Future License (TPY)	Net Change (TPY)	Sig. Level
PM	29.59	29.59	0	100
PM_{10}	16.98	16.98	0	100
SO_2	10.87	10.87	0	100
NOx	33.12	33.12	0	100
CO	41.55	41.55	0	100
VOC	17.72*	32.33	+14.61	50

*The VOC TPY includes VOC from Maine Wood's Boiler, Furnace and Drying Kilns. The Drying Kiln VOC TPY was calculated using an emission factor of 2.26 lb VOC/MBF. Thus it is lower than the VOC TPY licensed in A-736-71-C-A. See Section (II)(B).

This modification is determined to be a minor modification and has been processed as such.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in Chapter 100 of the Department regulations. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas. BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in Chapter 100 of the Department's regulations. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. Description of Amendment

Maine Woods is proposing to install three additional kilns (resulting in total kiln capacity of 800,000 BF at any one time) and to shorten its wood drying schedule to 12 days. This will result in a total kiln production of 24,334 MBF/year.

License A-736-71-B-R calculated emissions from the drying kilns based on *NCASI Technical Bulletin No. 718*, dated July 1996. This publication presents representative emission factors for the drying of a variety of different wood species, but not the exact species dried by Maine Woods. In general, the softwood species represented in the bulletin have higher VOC emission potentials – at least 2.5 times higher – than the hardwoods do. VOC emissions in License A-736-71-B-R were conservatively calculated using the wood species from the bulletin with the highest emission potential, even though this is a softwood which does not grow in the area. Maine Woods Company dries hardwoods (Sugar

Maple, Soft Maple and Yellow Birch) that are indigenous to the State of Maine in its kilns. Drying kiln emissions would be more accurately represented by an emission factor for a local species. For the purposes of this License Amendment the emission factor for White Pine (2.26 lb VOC/MBF) shall be used. White Pine is a softwood species and continues to represent a conservative approach to VOC emission calculation from the wood drying kilns.

C. BACT for the New Kilns

1. Drying Kiln Description

The new drying kilns will dry the lumber after it has been cut to size. The kilns will be heated with steam from Maine Woods' biomass boiler. Emissions result from the release of VOCs (including pinenes, terpenes, aldehydes, ketones and methanol) from the tannins, resins, fats, waxes, oils, gums and other aromatic compounds which naturally occur in the wood and are released during kiln drying. VOC emissions are emitted through roof vents from the drying kiln with the moisture (water vapor) extracted from the lumber.

The kiln will process hardwood species hardwoods (Sugar Maple, Oregon (Soft) Maple and Yellow Birch). The drying cycle will require approximately 288 hours, for all species dried. Emissions from the drying kilns are expected to result in 27.5 tons of VOC/year (using a conservative emission factor for White Pine of 2.26 lb/MBF). The VOC emissions will be mixed with the total volumetric air flow of 4,950,000 cubic feet/hour (82,500 ACFM). Thus VOC concentration in the exhaust stream will be extremely low.

2. BACT Analysis

(i) Control of VOC

Potential relevant control technologies for VOC include carbon adsorption, absorption/scrubbing systems, condensation, biofiltration, catalytic oxidation and thermal oxidation. Selection of a control technology is made on the basis of stream-specific characteristics such as flow rate, hydrocarbon concentration, temperature, and moisture content.

In a carbon adsorption system, process exhaust is contacted with an adsorbent media (typically activated carbon) to remove VOCs from the exhaust stream. The adsorption process is highly exothermic, with the heat of adsorption typically equaling or exceeding the heat of condensation. Over time the adsorption media will be saturated with VOCs, requiring that it be "desorbed" prior to further use. Desorption results in the creation of VOC laden wastewater that must be treated prior to discharge. Little data supports the success of carbon adsorption for controlling the mixture of VOCs expected from kiln drying. The volume of water released by the kiln makes adsorption infeasible.

Absorption/scrubbing systems utilize gas/liquid contact to absorb VOCs from the process exhaust stream into a liquid stream. The scrubbing liquid may be water, acid, caustic, or organic in nature, depending on the characteristics of the VOC contaminants. Scrubbing liquid requires further treatment after it has absorbed or scrubbed VOCs from the exhaust stream. This is typically accomplished through wastewater treatment processes. Absorption/scrubbing systems are employed on concentrated gas streams that provide a significant concentration gradient to aid absorption of VOCs into the scrubbing liquid. The exhaust stream from the kiln will not contain high concentrations of VOCs. No single absorbent can effectively remove the variety of VOCs that will be present in the exhaust stream. Thus absorbers/scrubbers are not considered a feasible option to control VOCs from the drying kiln.

Condensation is a separation technique in which one or more volatile components of a vapor mixture are separated from the remaining vapors through saturation followed by a phase change. Condensers are not a feasible control option for the kiln drying operation because the concentration of VOCs in the emission stream is too low. Water condensed out of the kiln exhaust air with an air to air condenser would generate several thousand gallons of water per day containing <0.001 lb VOC/gallon. Condensers are rarely employed for controlling VOCs in emission streams where the concentration is less than 5,000 ppmv. Additionally, this technology has not been proven for similar types of applications and would generate a liquid organic waste material that may require special handling and disposal.

Biofilters and biotrickling filters operate by passing the VOC laden stream through organic or inorganic structural media containing microbes. The VOCs are degraded by the microbial populations living in the media. Biotrickling filters have not been proven effective for similar types of applications. Biofilters depend on constant pollutant streams with high humidity. Periods of pollution starvation caused by interruptions in plant operation affect VOC removal efficiency. Capital installation costs associated with a biofilter designed for an 80,000 acfm emission stream achieving 90 percent control is estimated to be approximately $2,400,000. The footprint for such a biofilter is approximately 8,600 square feet. Organic biofilter packing must be replaced every one to three years due to packing deterioration. Inorganic packing must be replaced once every ten years. While biofiltration is a technically feasible control option, pilot tests would need to be conducted to determine the VOC reduction efficiencies for the types of VOCs generated by the drying kiln, and the capital cost of such a system renders this option infeasible.

Catalytic oxidation is a process whereby a catalyst is used to significantly decrease the temperature at which oxidation of VOCs will occur. These catalysts are typically based on a noble metal, and can be contained in a fixed or fluidized bed. Despite the decreased oxidation temperature, process exhaust gas must still be preheated, typically through heat exchange or direct heating in a combustion chamber, prior to contacting with the catalyst bed. Catalytic oxidizers are very sensitive to particle contamination, and can normally only be used on very "clean" exhaust streams containing little or no particulate. For this reason, catalytic oxidation is not considered a feasible option.

Thermal oxidation uses a nozzle-stabilized flame to heat flue gas to ignition temperatures in a combustion chamber. The heat of combustion of the VOCs in the exhaust stream and the consumption of supplemental fuel provide the heat energy required to maintain appropriate temperatures in the combustion chamber. Many thermal oxidation systems are equipped with devices to recover the heat generated through oxidation, either with a heat exchanger to preheat the exhaust gases entering the combustion chamber (recuperative thermal oxidation), or with a series of staggered combustion chambers that either preheat exhaust gases or oxidize the preheated gases (regenerative thermal oxidation.)

Both regenerative and recuperative thermal oxidizers are technically feasible control options, however high capital costs and poor destruction efficiencies associated with treating an exhaust stream with low VOC concentration make these options cost prohibitive. Thermal oxidation is most economical when the inlet concentration is between 1500 and 3000 ppmv VOC because the heat of combustion of the hydrocarbon gases is sufficient to sustain combustion with the addition of expensive auxiliary fuel.

Other control options include a combination adsorber/thermal oxidizer and incineration of the VOC laden stream in a combustion unit. In a combination adsorber/thermal oxidizer system, VOCs are adsorbed in a fixed bed, then desorbed into a thermal oxidizer. Supplementary fuel requirements are lowered because the VOCs in the gas stream are concentrated, however such a system is typically more expensive to install than either component on a stand-alone basis. This technology has not been proven for similar types of applications so a combination adsorber/thermal oxidizer is not considered technically feasible.

Emissions from the kiln drying system could be ducted to the biomass boilers. However, given the high-volume, low-VOC concentration, and

moisture content of the drying kiln exhaust, this control option is not technically feasible.

(ii) Visible Emissions

MEDEP Chapter 101 limits visible emissions from general process sources to 20% opacity on a 6-minute block average basis, except for no more than one 6-minute block average in a 1-hour period.

3. BACT Determination

Add-on VOC emission controls are not technically feasible due to the numerous exhaust points on the kiln, varied kiln flow rates, high moisture content, low VOC concentration and variety of VOCs expected in the exhaust streams. The RBLC database indicates that BACT for the drying kiln is no control.

The Department finds that BACT for VOC control from the drying kiln is no control, and a visible emissions limit of 20% on a 6-minute block average basis. Annual VOC emissions are calculated using an emission factor for White Pine of 2.26 lb VOC/MBF, as a conservative estimate of VOC emissions from the drying kilns. Based on an annual production of 24,334 MBF per year, worst-case annual VOC emissions from the drying kiln is estimated to be approximately 27.5 tons/year. The Department finds the emission factors in conjunction with no control represent BACT.

D. Annual Emissions

Maine Woods shall be restricted to the following annual emissions, based on a 12 month rolling total:

Total Licensed Annual Emissions for the Facility
Tons/year
(used to calculate the annual license fee)

	PM	**PM_{10}**	**SO_2**	**NOx**	**CO**	**VOC**
Boilers	27.75	15.14	3.15	27.75	41.00	4.79
Furnace	1.84	1.84	7.72	5.37	0.55	0.04
Drying Kilns	--	--	--	--	--	27.5
Total TPY	**29.59**	**16.98**	**10.87**	**33.12**	**41.55**	**32.33**

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-736-71-C-A subject to the conditions found in Air Emission License A-736-71-B-R and in the following conditions:

The following replaces Condition (18) of License A-736-71-B-R

(18) **Drying Kilns**

A. Yearly throughput is limited to 24,333,333 board feet per year based on a 12-month rolling total. Compliance shall be demonstrated through kiln loading records.

B. Maine Woods shall dry hardwood species in the drying kilns and shall notify the Department prior to drying softwood species in the kilns.

C. Visible emissions from the drying kiln vents shall not exceed 20% opacity on a 6-minute block average, except for no more than one 6-minute block averages in a 1-hour period. [MEDEP Chapter 101]

(19) Maine Woods shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard. [38 MRSA §605]

(20) **Annual Emission Statement**

In accordance with MEDEP Chapter 137, the licensee shall annually report to the Department the information necessary to accurately update the State's emission inventory by means of:

A. A computer program and accompanying instructions supplied by the Department; or

B. A written emission statement containing the information required in MEDEP Chapter 137.

C. Reports and questions should be directed to:
Attn: Criteria Emission Inventory Coordinator
Maine DEP - Bureau of Air Quality
17 State House Station
Augusta, ME 04333-0017
Phone: (207) 287-2437

The emission statement must be submitted by July 1 or as otherwise specified in Chapter 137.

(21) **Air Toxics Emission Statement**

If Maine Woods fires more than 1,200 tons of wood in Boiler #1 in an inventory year, in accordance with MEDEP Chapter 137, the licensee shall report, no later than July 1, every three years (2005, 2008, 2011, etc.), the information necessary to accurately update the State's toxic air pollutants emission inventory by means of a written emission statement containing the information required in MEDEP Chapter 137.

Reports and questions on the Air Toxics emissions inventory portion should be directed to:

Attn: Toxics Inventory Coordinator
Maine DEP - Bureau of Air Quality
17 State House Station
Augusta, ME 04333-0017
Phone: (207) 287-2437

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF 2004.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
DAWN R. GALLAGHER, COMMISSIONER

The term of this amendment shall be concurrent with the term of Air Emission License A-736-71-B-R.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: November 19, 2004
Date of application acceptance: November 22, 2004

Date filed with the Board of Environmental Protection: _____

This Order prepared by Rachel E. Pilling, Bureau of Air Quality.